



Entergy Nuclear Northeast
Entergy Nuclear Operations, Inc.
James A. Fitzpatrick NPP
P.O. Box 110
Lycoming, NY 13093
Tel 315 349 6024 Fax 315 349 6480

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JAFF-07-0001

Pete Dietrich
Site Vice President - JAF

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: **Docket No. 50-333**
LICENSEE EVENT REPORT: LER-06-002 (CR-JAF-2006-04754)

High Pressure Coolant Injection System Declared Inoperable Due to Turbine Speed Oscillations

Dear Sir:

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(B) and (D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident."

There are no commitments contained in this report.

Questions concerning this report may be addressed to Mr. Jim Costedio at (315) 349-6358.

Very truly yours,

Pete Dietrich

PD:DD:dd
Enclosure

cc: USNRC, Region 1
USNRC, Project Directorate
USNRC Resident Inspector
INPO Records Center

IE22

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(See reverse for required number of digits/characters for each block)

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4. TITLE High Pressure Coolant Injection System (HPCI) Declared Inoperable Due to Turbine Speed Oscillations.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
11	04	06	06	002	00	01	03	07	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)									
	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)						
10. POWER LEVEL 20	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)						
	20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)						
[REDACTED]	20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)						
	20.2203(a)(2)(ii)	50.36(c)(2)	X 50.73(a)(2)(v)(B)	OTHER						
	20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A						
	20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	X 50.73(a)(2)(v)(D)							
	20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)							
	20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)							
	20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)							

12. LICENSEE CONTACT FOR THIS LER

NAME Mr. Darren Deretz, Sr. Regulatory Compliance Specialist	TELEPHONE NUMBER (Include Area Code) (315) 349-6851
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A	BJ	65	W290	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE		
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO		MONTH	DAY	YEAR

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On November 4, 2006, at 1810 hours, with the plant operating at approximately 20 percent power in Mode 1, Operations determined that the High Pressure Coolant Injection (HPCI) [BJ] System was inoperable due to HPCI flow and turbine speed oscillations during post work testing following refueling outage work activities.

During this post work testing, the HPCI turbine operated for approximately one minute, within required flow limits, but was manually tripped by the Operations crew when oscillations did not improve. The Operations crew declared the HPCI System inoperable until the unexpected oscillations could be evaluated and resolved. A 14 day TS LCO was entered as required. The NRC Operations Center was informed via the Emergency Notification System at 2101 hours on November 4, 2006. All other ECCS and RCIC remained operable.

The turbine speed oscillations were caused by two turbine governor hydraulic actuator oil lines incorrectly connected during maintenance activities. The oil lines were reconnected to their correct ports.

There were no adverse nuclear, radiological or safety consequences associated with this event.

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EIS Codes in []

BACKGROUND

The High Pressure Coolant Injection (HPCI) [BJ] turbine speed is controlled by a Woodward EG Series Electric Type Governor. The governor serves to maintain a constant speed for all loads within the capacity of the turbine except momentarily at a time when a load change occurs. The EG governor consists essentially of three separate assemblies: a control box, a speed adjusting potentiometer and a hydraulic actuator.

The output signal of the EG control box serves as the input signal to the EG hydraulic actuator; the actuator in turn controls the turbine control valve which regulates turbine steam flow. The EG hydraulic actuator possesses a buffering mechanism that regulates oil flow and serves to reduce turbine speed oscillations.

EVENT DESCRIPTION

On November 4, 2006, at approximately 1810 hours, with the plant operating at approximately 20 percent power in Mode 1, Operations determined that the HPCI System was inoperable due to HPCI flow and turbine speed oscillations during surveillance test ST-4N "HPCI Quick Start, Inservice and Transient Monitoring Test (IST)", performed as part of post work testing following refueling outage work activities. The HPCI pump flow oscillated between 3646 gallons per minute (gpm) and 4375 gpm, within range limits and above the minimum TS flow requirement of 3400 gpm. The frequency of these cycles ranged from three to five seconds.

During this ST, the HPCI System operated for approximately one minute within required flow ranges but was manually tripped by the Operations crew when oscillations did not improve. The Operations crew declared the HPCI System inoperable until the unexpected oscillations could be evaluated and resolved. TS Limiting Conditions for Operation (LCO) 3.5.1 Condition C was entered with an Allowed Out of Service Time (AOT) of 14 days.

The NRC Operations Center was informed via the Emergency Notification System at 2101 hours on November 4, 2006 in accordance with 10 CFR 50.72(b)(3)(v). All other Emergency Core Cooling Systems (ECCS) and the Reactor Core Isolation Cooling System (RCIC) remained operable.

During troubleshooting of the HPCI turbine, mechanics discovered two hydraulic oil lines to the HPCI turbine EG hydraulic actuator connected to the wrong oil ports. The "A" and "C" lines were connected to the "C" and "A" ports respectively. With the "A" line and the "C" lines swapped the flow of oil to and from the servo piston was impacted. Instead of hydraulic oil from the pump being supplied directly to one end of the buffer piston it was supplied to the underside of the power piston and the supply oil that should have been connected to the underside of the power piston was instead connected to the seal grooves in the servo. This caused the HPCI EG hydraulic actuator buffer mechanism to be bypassed which resulted in turbine speed oscillations.

The oil lines were reconfigured to their proper ports and ST-4N was commenced at 0658 hours on November 5, 2006 at approximately 977 psig. HPCI flow and turbine speed was as expected with no abnormal oscillations. HPCI was declared operable at 1100 hours on November 5, 2006.

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CAUSE OF EVENT

A HPCI minor maintenance inspection was performed in October 2006 during refuel outage 17. This inspection consisted of removal and inspection of the Gland Seals, Journal Bearings, Thrust Bearings, the Over Speed Trip Tappet and measurements of shaft thrusts, bearing clearances and seal clearances. Maintenance Department mechanics reattached the control oil lines incorrectly during these planned HPCI maintenance activities and failed to adequately self-check or adequately perform a procedurally required verification. The "A" and "C" oil ports on the actuator were correctly identified using an ink marker plus hard punch marks from previous maintenance and the oil tubing is correctly identified with permanent plastic labels. No time or situational pressures during these maintenance activities were identified. The cause of the incorrectly connected EG hydraulic actuator oil lines was inadequate work practice.

[Cause Code A]

EVENT ANALYSIS

Actual Consequences

Because the HPCI System had been taken out of service for surveillance testing at the time of this event, actual consequences were limited to the unplanned unavailability of the system.

The HPCI System was last tested as required by TS and declared operable on November 4, 2006, at 0706 hours upon satisfactory completion of ST-4N at 150 psig reactor pressure. Oscillations were not observed during this test. HPCI was placed in stand-by until the required operability run at rated reactor pressure, performed at 1810 hours, at which time oscillations occurred and HPCI declared inoperable. HPCI was repaired, tested and declared operable at 1100 hours on November 5, 2006. It is conservatively estimated that HPCI was inoperable for approximately 28 hours, which is well within the TS LCO 3.5.1 Allowed Out of Service Time (AOT) of 14 days.

Potential Consequences

The HPCI System is required to function as an injection source to mitigate Loss of Coolant Accidents over a reactor pressure range from 150 psig to 1195 psig. Following this event, an evaluation was conducted to determine if the condition described in this report would have prevented the HPCI system from successfully injecting to the reactor. Due to the potential impact of the continued speed oscillations on various HPCI System critical components, operability could not be confirmed for the HPCI mission time of 8 hours.

The safety significance of the condition was minimal based on the Automatic Depressurization System (ADS) [SB], the Residual Heat Removal (RHR) System [BO], and the Core Spray (CS) System [BM] being available as emergency core cooling systems during the period HPCI was inoperable. The Reactor Core Isolation Cooling (RCIC) System [BN] was also available as a source of high pressure injection during this period.

The HPCI System achieved the required minimum flow requirement in the required time as demonstrated during the surveillance tests. However, the operability evaluation concluded that operability could not be confirmed over HPCI's entire mission time, assuming the oscillations continued. This condition is therefore considered reportable under 10 CFR 50.73(a)(2)(v)(B) and (D), "Any event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat and mitigate the consequences of an accident."

There were no adverse nuclear, radiological or safety consequences associated with this event.

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CORRECTIVE ACTIONS

Corrective Actions Completed by JAF Prior to this Report:

1. Reconnected the HPCI oil lines to the correct ports.
2. Counseled the involved Maintenance Department mechanics regarding proper use of self-checking, peer checking, and verification practices.

Corrective Actions not yet Completed:

1. Provide performer/verifier training to mechanics.

SAFETY SYSTEM FUNCTIONAL FAILURE REVIEW

The HPCI inoperability constituted a Safety System Functional Failure as defined by NEI 99-02 Revision 4.

SIMILAR EVENTS

A review of LERs at JAF identified four LERs concerning HPCI; LERs 1999-011, 2000-002, 2000-013 and 2000-016. The corrective actions from those events are not expected to have prevented this event because the cause of this event is unrelated.

FAILED COMPONENT IDENTIFICATION

There was no component failure. The event was caused by incorrectly configured control oil lines caused by human error during maintenance activities. The affected component information is as follows:

Component Description: HPCI Turbine Hydraulic Governor Actuator
 Component Mark Number: 23GOV-1
 Manufacturer: Woodward Governor Company
 Model Number: DR9903-099

REFERENCES

1. Apparent Cause Evaluation (ACE), JAF Condition Report CR-JAF-2006-04754, HPCI Flow and Turbine Speed Oscillations.